# Results of forest insect and disease surveys in the CENTRAL REGION of Ontario, 1989

**CARRIED OUT BY THE GREAT LAKES FORESTRY CENTRE IN COOPERATION WITH THE ONTARIO MINISTRY OF NATURAL RESOURCES**

**W.D. Biggs, C.G. Jones and E.J. Czerwinski**

**Miscellaneous Report No. 90**

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## FORESTRY CANADA, ONTARIO REGION

Ontario Region is one of six regional establishments located across Canada and operated by Forestry Canada. The overall objective of Forestry Canada is to promote the preservation, enhancement and wise use of a healthy, attractive and bountiful forest resource and terrestrial environment for the economic and social benefit of all Canadians. Ontario Region pursues this objective by conducting two major programs: research and technical services and forestry development. Both programs address major problems affecting forest management and the forest environment primarily in Ontario, but because of the transprovincial nature of the forest resource, many elements of our research program are of national significance.

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It is recognized that forested land must be managed in the best public interest, not only for the wood production essential to our economy, but also for the recreational purposes that are so important to our social well-being. This must be achieved in a manner that will maintain or improve the quality of the forest environment and preserve it for generations to come.

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# RESULTS OF FOREST INSECT AND DISEASE SURVEYS IN THE CENTRAL REGION OF ONTARIO 1989

(FOREST DISTRICTS: HURONIA, LINDSAY, CAMBRIDGE, MAPLE AND NIAGARA)

W.D. Biggs, C.G. Jones and E.J. Czerwinski

FORESTRY CANADA

ONTARIO REGION

GREAT LAKES FORESTRY CENTRE

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## SURVEY HIGHLIGHTS

This report presents data collected by the Forest Insect and Disease Survey (FIDS) in 1989 on various insects, diseases and abiotic damage in the Central Region. The pear thrips, a new insect pest on forest trees, was collected in the region for the first time. Population levels of gypsy moth, forest tent caterpillar, larch casebearer and spruce budworm increased this year. Cedar leafminers and oak leaf shredder populations declined in most areas of the region.

There were no noteworthy changes in the status of tree diseases in 1989. In an effort to increase our information on sugar maple, additional maple health plots were established and the existing plots were retallied. Drought-related damage was less extensive in 1989 than in previous years. Eastern white pine plantations and cones were examined as part of a special conifer survey. Information obtained from the two Ontario Ministry of Natural Resources (OMNR) forest tree nurseries is included in this report.

Insects and diseases described in this report fall into three categories, on the basis of their importance:

*Major Insects or Diseases*

capable of causing serious injury to or death of living trees or shrubs

*Minor Insects or Diseases*

capable of causing sporadic or localized injury but not usually a serious threat to living trees or shrubs (No minor insects or diseases were reported in the Central Region in 1989.)

*Other Forest Insects and Diseases (Tables)*

These tables provide information on two types of pest:

(1) those that are of minor importance and have not been known to cause serious damage to forest trees

(2) those that are capable of causing serious damage but, because of low populations or for other reasons, did not cause serious damage this year.

The cooperation and assistance provided by OMNR, Agriculture Canada and other government agencies and individuals are gratefully acknowledged.

If further information is required about pest conditions in the Central Region, please contact W.D. Biggs or write to the Chief, Forest Insect and Disease Survey Unit, Forestry Canada, Ontario Region, P.O. Box 490, Sault Ste. Marie, Ontario, P6A 5M7.

W.D. Biggs

Frontispiece

Typical damage to sugar maple (*Acer saccharum* Marsh.) foliage caused by pear thrips, *Taeniothrips inconsequens* (Uzel)

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## INSECTS

### *Major Insects*

Cedar Leafminers, *Argyresthia aureoargentella* Brower, *A. canadensis* Free, *A. thuiella* (Pack.) and *Coleotechnites thujaella* (Kft.)

Population levels of this complex of insects that feed on eastern white cedar (*Thuja occidentalis* L.) have been steadily increasing over the past couple of years. In 1988, moderate-to-severe damage was observed north of a line running from Peterborough in Lindsay District to Orangeville in Huronia District. However, in 1989, a marked reduction in populations was noted and, consequently, only occasional pockets of light-to-moderate damage were detected in two districts. Pockets of leafmining damage, usually 1 to 5 ha in size and in the 10 to 40% range, were found in the southern part of Lindsay District (particularly in Haldimand Township) and in Medonte, Tay and Flos townships in the Huronia District. Smaller populations were present at many other sites in the Central Region, but were not significant enough to cause noteworthy browning.

Another condition affecting eastern white cedar and causing it to turn brown was very apparent in 1989. In many areas across Huronia, Maple and Lindsay districts, a very heavy seed crop was present in 1988 and the cones turned brown and were retained by the tree until the following year. Therefore, the presence of this bumper crop of cones caused many stands to appear brown, and from a distance the damage appeared similar to that caused by cedar leafminers. In addition, winter browning, old damage by spider mite, *Oligonychus ununguis* (Jac.), and salt damage along roadways contributed to this condition.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

The population reductions recorded across the province in recent years were reversed in 1989. An increase of about one million ha of moderate-to-severe defoliation was recorded in northwestern Ontario. In all, 6,239,636 ha of moderate-to-severe defoliation were mapped in the Northwestern and North Central regions. Also, the gross area of budworm-killed balsam fir (*Abies balsamea* [L.] Mill.) rose by slightly over 500,000 ha to encompass an area of 15,044,874 ha. The increased areas of mortality were mapped in the Northwestern and North Central regions.

Similar population trends were found in the Central Region. Relatively high populations of spruce budworm, resulting in defoliation levels of 40 to 90% on the new growth, were present in two adjacent white spruce (*Picea glauca* [Moench] Voss) plantations totaling about 11 ha in Adjala Township, Huronia District. Moderate population levels were observed in a small white spruce plantation in Uxbridge Township, Maple District, with defoliation levels averaging 30%. Low populations were present in four other white spruce plantations located in West Gwillimbury Township, Huronia District; in Nichol and West Luther

townships, Cambridge District; and in Darlington Township, Lindsay District. Egg-mass surveys carried out in August revealed sufficient eggs for a severe infestation forecast for 1990 in the plantation in Uxbridge Township, Maple District and a moderate-to-severe infestation forecast in Adjala Township, Huronia District. Egg counts were lower at the locations sampled in Lindsay District, with a light-to-moderate infestation forecast for 1990 in Clarke Township and a light forecast in Darlington Township.

Larch Casebearer, *Coleophora laricella* (Hbn.)

Larch casebearer has been found at various population levels for the past several years in the Central Region. However, in 1989 there was a marked increase in population levels across the entire region.

This insect feeds equally on native and exotic larch (*Larix* spp.) and in Canada is considered the second most threatening insect pest of larch after the larch sawfly, *Pristiphora erichsonii* (Htg.). The tiny, silver-gray moth lays its eggs toward the end of June. After about 10 days, the eggs hatch; the newborn larva bores a hole into a needle and begins mining it, attacking more than one needle before autumn. When populations are high, foliar browning is noticeable from late August to early September. The larva remains enclosed in the needle. Later, it cuts the needle to form a chamber in which it spends the rest of the larval period; hence the name casebearer. With the onset of cold weather, the larva fastens its case to a twig near the base of new buds, where it overwinters. In spring, once the foliage has begun to develop, the larva begins its needle-feeding process again, with the hind part of its body hidden in the case. It is during this period, when the mature larva attacks the new needles, that the most serious damage occurs. The attacked needles are not completely consumed, but remain on the twigs to dry out and turn brown. A heavily infested stand will therefore appear brown.

Foliar browning in the 75-100% range was observed in 5 ha of scattered tamarack (*Larix laricina* [Du Roi] K. Koch) in Erin Township, Cambridge District, on 7 ha of European larch (*L. decidua* Mill.) in West Gwillimbury Township and at two locations in Adjala Township, Huronia District. Damage levels in the 50-80% range were found in small European larch plantations usually less than 1 ha in size in Medonte, Sunnidale and Flos townships in Huronia District, in Whitchurch and Uxbridge townships, Maple District, and in Reach Township, Lindsay District. An additional 10-ha plantation in Haldimand Township, Lindsay District suffered similar damage. Tamarack stands with foliar browning in the 50-80% range were also observed in Mono Township and over a 2-ha area in Amaranth Township, Huronia District. Foliar damage was noticeable on scattered European larch growing beside the Niagara Parkway in Willoughby Township, Niagara District. Lower damage levels were observed at numerous other sites in the region.

Oak Leaf Shredder, *Croesia semipurpurana* (Kft.)

The growing populations of 1988 collapsed in 1989, as predicted in the egg survey. No areas suffered noticeable defoliation caused by this insect. In the study plots, average defoliation levels did not surpass 25%. Generally, moth catches were down, with the exception of minor increases at two sites in Huronia District, one plot in Maple District, and three of the four locations in Niagara District (Table 1). The numbers of eggs found at most of the plot locations were down from those of last year. However, egg numbers did increase at one site in the Dufferin County Forest, Huronia District, with the result that moderate defoliation was forecast for 1990. A review of the overall results for these study areas in the three districts indicates that oak leaf shredder will not be a problem in 1990.

Gypsy Moth, *Lymantria dispar* (L.)

Population levels of this insect have increased considerably in the Central Region, particularly in Lindsay and Niagara districts. Damage in 1988 covered an area of 889 ha and was found mainly in Lindsay District. In 1989 there was an increase of over 5,000 ha in the area damaged. The regional total for 1989 is 6,618 ha.

High populations were found in the south-central and southeastern parts of Lindsay District, with feeding mainly on oak (*Quercus* spp.), trembling aspen (*Populus tremuloides* Michx.) and eastern white pine (*Pinus strobus* L.). In 1989, moderate-to-severe defoliation extended over 4,071 ha, a substantial increase from the 861 ha mapped in 1988. The largest pockets of defoliation in the 75-100% range were found between the city of Peterborough and the southwestern part of Rice Lake in Cavan and Monaghan townships. The largest single area damaged was 500 ha (Fig 1). An additional large pocket, about 200 ha in area, was found in the Hiawatha Indian Reserve where the Otonabee River flows into Rice Lake. Concentrations of pockets ranging in size from 5 to 185 ha were mapped south of Rice Lake in the Alderville Indian Reserve, and in Haldimand and Alnwick townships, Lindsay District. Scattered, small pockets of moderate-to-severe defoliation were present east of Peterborough up to the district boundary in Otonabee, Asphodel and Belmont townships, and to a lesser degree in Douro and Dummer townships. Isolated areas of damage up to 20 ha in size were found as far west as the Pontypool area in Clarke and Manvers townships. In the northeastern part of Lindsay District, some defoliation of oak and aspen was attributed to the forest tent caterpillar, *Malacosoma disstria* Hbn. However, gypsy moth populations were sufficiently high to cause moderate damage to about 500 ha in the Buckhorn area. Moderate defoliation was also detected at one very small site on Sturgeon Point in Fenelon Township. A concentration of light defoliation was found along the district boundary in the northern portions of Dummer and Smith townships. Larvae were observed at numerous other points in the Lindsay District, but not at damaging levels.

Table 1. Results of oak leaf shredder pheromone trapping, defoliation estimates and egg counts in 1989, and defoliation forecasts for 1990 in the Central Region (five traps deployed at each location)

| Location (Twp) | | Total no. of adults captured | | Avg no. per trap | | Leaves attacked 1989 (%) | Foliar damage 1989 (%) | Total no. of eggs | | Defoliation forecast for 1990 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1988 | 1989 | 1988 | 1989 | | | 1988 | 1989 | |
| **Huronia District** | | | | | | | | | | |
| Awenda Prov Pk | 4 | 524 | 17 | 105 | 3 | b | b | 24 | 4 | light |
| | 5 | 134 | 9 | 27 | 2 | b | b | 1 | 0 | nil |
| | 11 | 890 | 373 | 178 | 75 | b | b | 0 | 0 | nil |
| Dufferin County Forest | 3 | 90 | 0 | 18 | 0 | 86 | 21 | 0 | 0 | nil |
| | 9 | 207 | 4 | 41 | 0.8 | 86 | 16 | 7 | 0 | nil |
| | 10 | 812 | 730 | 162 | 146 | 76 | 16 | 3 | 2 | light |
| | 12 | 234 | 1[a] | 47 | 0.2 | 75 | 13 | 1 | 0 | nil |
| | 95 | 612 | 353 | 122 | 71 | 68 | 11 | 1 | 0 | nil |
| check | 3 | 613 | 726 | 123 | 145 | 86 | 25 | 9 | 96 | moderate |
| Hendrie | 1 | 369 | 103 | 74 | 21 | 92 | 22 | 9 | 7 | light |
| Midhurst | 1 | 399 | 126 | 80 | 25 | 69 | 18 | 2 | 0 | nil |
| Orr Lake - Danials | | 736 | 323 | 147 | 65 | 91 | 16 | 0 | 0 | nil |
| Wildman Tract | 4 | 19 | 1 | 4 | 0.2 | 73 | 15 | 0 | 0 | nil |
| | 7 | 368 | 189 | 74 | 38 | 86 | 15 | 1 | 0 | nil |
| **Maple District** | | | | | | | | | | |
| Uxbridge Twp | 1 | 561 | 24 | 112 | 5 | 100 | 26 | 26 | 11 | light |
| | 2 | 634 | 674 | 127 | 135 | 87 | 17 | 20 | 2 | light |
| **Niagara District** | | | | | | | | | | |
| Cayuga Twp | 1 | 118 | 41 | 24 | 8 | 25 | 2 | 2 | 0 | nil |
| Thorold | 6 | 473 | 825 | 118 | 165 | 0 | 0 | 30 | 29 | light |
| Pelham | 7 | 474 | 955 | 95 | 191 | 10 | 2 | 19 | 29 | light |
| West Lincoln Twp | 2 | 633 | 986 | 127 | 197 | 30 | 4 | 5 | 18 | light |

[a] four pheromone traps
[b] area defoliated by forest tent caterpillar or gypsy moth

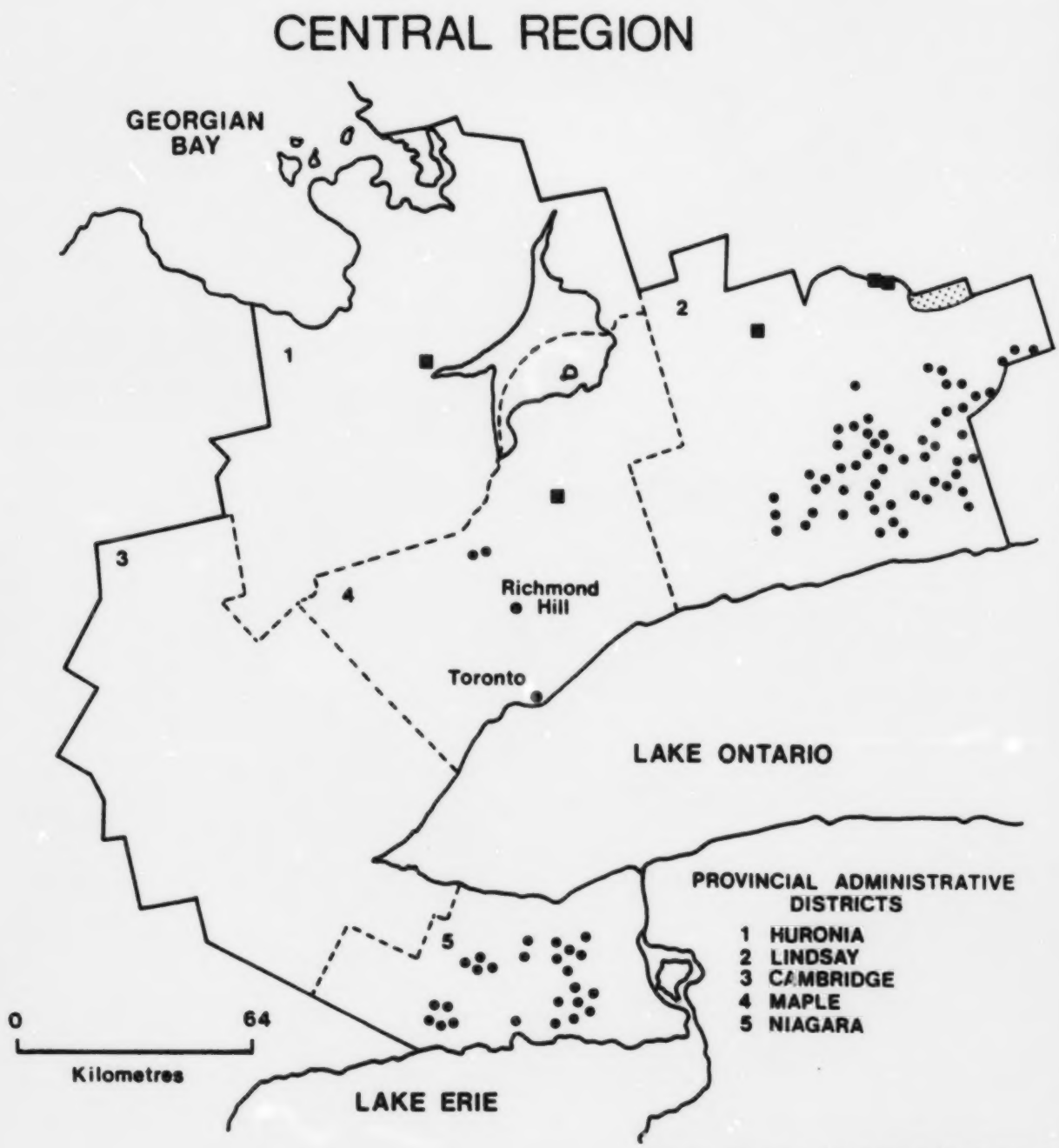


Figure 1. **Gypsy moth, *Lymantria dispar* (L.)** Areas within which defoliation occurre in 1989

Moderate-to-severe .....
Moderate .....
Light .....

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The Niagara District was the next most affected district in the region in 1989, with 2,177 ha of moderate-to-severe defoliation (Fig. 1) in comparison with only 28 ha in 1988. The largest single area of damage (1986 ha) was south of the city of Welland near Wainfleet Marsh. Here, gypsy moth larvae defoliated mainly trembling aspen, willow (*Salix* spp.) and alder (*Alnus* spp.). Near this large infestation, pockets ranging in size from 6 to 55 ha were mapped in Wainfleet and Cumberstone townships. The next largest concentration of moderate-to-severe defoliation was found in an area north of Fonthill through to Lake Moodie. This area, also known as the Short Hills and St. Johns Valley, was covered by numerous pockets of damage up to 100 ha in size. The tree species most affected in these areas was oak, with defoliation levels ranging from 45 to 80%. Moderate-to-severe defoliation of willow was aerially mapped in a cluster of eight pockets along the Grand River to the northwest of Dunnville. Additional isolated areas of defoliation were found in Gainsborough Township and lower populations were observed from Port Maitland east to Port Colborne along the Lake Erie shoreline in Niagara District, although no defoliation resulted.

Populations are increasing in the Maple and Huronia districts. For the first time, moderate-to-severe defoliation was detected in the Maple District. A 370-ha pocket of mixed hardwoods had defoliation levels in the 40-100% range. This pocket was located on a ridge that straddled Highway 400 in King Township (Fig. 1). Moderate defoliation of red oak (*Quercus rubra* L.) was evident in a 113-ha area in East Gwillimbury Township, Maple District, and in a 130-ha area just outside the city of Barrie in Vespra Township, Huronia District. Larvae were easily found in the Main and West tracts in Uxbridge Township, Maple District, but not at damaging levels. Larval populations were sufficiently high in Six Mile Lake and Awenda provincial parks, Huronia District, to cause some defoliation, but the presence of forest tent caterpillar defoliation made assessment impossible. Populations are building in the northern half of the Huronia District, with trace-to-low levels found at many sites in this area.

As can be seen from Table 2, larvae have now been caught in all provincial parks where burlap traps are placed except for Earl Rowe in Huronia District. Numbers of male moths captured in the pheromone traps increased in 1989 except in two parks in the Lindsay District (Table 2). From a very limited number of egg-mass observations made, it appears that gypsy moth populations will continue to grow where the insect is already established.

Eastern Tent Caterpillar, *Malacosoma americanum* (F.)

Populations were a little lower in 1989 in comparison with the high levels of the past few years. Numerous small cherry (*Prunus* spp.) shrubs growing along roadways sustained fair-sized insect populations and were stripped of their foliage at many sites across the region. As in recent years, scattered mature black cherry (*P. serotina* Ehrh.) growing in mixed hardwood stands had defoliation levels ranging from 50 to 80% at

Table 2. Summary of gypsy moth burlap and pheromone trapping in provincial parks in the Central Region of Ontario

| Location | Burlap traps | | | | Pheromone traps | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total no. of larvae caught in 10 burlap traps | | Avg no. of larvae per observation | | No. of traps in 1989 | Total no. of moths caught | | Avg no. per trap | |
| | 1988 | 1989 | 1988 | 1989 | | 1988 | 1989 | 1988 | 1989 |
| **Cambridge District** | | | | | | | | | |
| Bronte Creek | 58 | 818 | 8 | 68 | 2 | 50 | 81 | 25 | 40 |
| **Huronia District** | | | | | | | | | |
| Awenda | 240 | 547 | 13 | 61 | 2 | 41 | 93 | 20 | 46 |
| Bass Lake | 43 | 333 | 2 | 48 | 2 | 31 | 71 | 15 | 35 |
| Devil's Glen | 0 | 1 | 0 | <1 | 2 | 33 | 50 | 16 | 25 |
| Earl Rowe | 0 | 0 | 0 | 0 | 2 | 36 | 49 | 18 | 24 |
| Mara | 0 | 44 | 0 | 4 | 2 | 31 | 55 | 15 | 27 |
| McRae Point | 30 | 172 | 7 | 17 | 2 | 36 | 48 | 18 | 24 |
| Six Mile Lake | 821 | 373 | 43 | 93 | 2 | 21 | 53 | 10 | 26 |
| Springwater | 26 | 103 | 4 | 4 | 2 | 23 | 69 | 11 | 34 |
| Wasaga Beach | 9 | 53 | 4 | 2 | 2 | 36 | 65 | 18 | 32 |
| CFB Borden[a] | - | - | - | - | 10 | 138 | 232 | 14 | 23 |
| **Lindsay District** | | | | | | | | | |
| Balsam Lake | 17 | 489 | b | 61 | 2 | 24 | 28 | 12 | 14 |
| Darlington | 11 | 26 | b | 5 | 1 | 39 | 22 | 19 | 22 |
| Emily | 4 | 291 | b | 9 | 1 | 45 | 48 | 22 | 48 |
| Mark S. Burnham | 0 | 8 | 0 | <1 | 2 | 45 | 32 | 22 | 16 |
| Serpent Mounds | 36 | 502 | b | 125 | 2 | 27 | 33 | 13 | 16 |
| **Maple District** | | | | | | | | | |
| Sibbald Point | 0 | 1 | 0 | <1 | 2 | 33 | 39 | 16 | 19 |
| **Niagara District** | | | | | | | | | |
| Rock Point | -[a] | - | - | - | 2 | - | 78 | - | 39 |

[a] no burlap trapping done
[b] data unavailable

various points in Tiny and Medonte townships in Huronia District. Tents made by this insect were common on shrubs and small trees at many other points in the region.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

The gross area of moderate-to-severe defoliation of various hardwoods increased by slightly over 100,000 ha. The total area infested in 1989 in the Lindsay, Huronia and Maple districts was 259,221 ha.

The infestation in the Lindsay District increased by 84,826 ha and now covers an area of 132,578 ha. The moderate-to-severe defoliation was evident mainly on trembling aspen and red oak across the northern portion of the district (Fig. 2), with most of Bexley, Harvey, Dummer and Belmont townships being affected. The northern portions of Eldon, Fenelon, Verulam, Smith and Douro townships made up the remainder of the area infested by forest tent caterpillar in the Lindsay District.

The area damaged in Huronia District was much the same as in 1988, although more defoliation was detected east of Lake Simcoe and in the Midland-Waubaushene area. The total area of infestation was 124,513 ha in 1989. Moderate-to-severe defoliation of trembling aspen and red oak was evident north of a line running from the Thunder Beach area southeast to Orillia (Fig. 2). Pockets of heavy defoliation were present over much of Rama Township and the northern and eastern parts of Mara Township. West of Highway 11 heavy damage was evident in most of Orillia, Matchedash and Baxter townships, with the northern portions of Tay and Tiny townships infested also. There was a reduction in area in the northern part of Baxter Township, which reflected the situation in Parry Sound District. Scattered pockets of moderate defoliation were mapped in Medonte and Oro townships as far west as the Edgar area.

For the first time noteworthy defoliation was found in the Maple District (Fig. 2). The infestation was made up of scattered pockets totaling 2,130 ha, with Georgina Island in Lake Simcoe making up the largest of these areas. Smaller scattered pockets of moderate defoliation of trembling aspen were observed in Brock, Thorah, Georgina and North Gwillimbury townships to the south and east of Lake Simcoe, Maple District. Individual larvae were observed at one location in Pelham Township, Niagara District.

An egg-mass survey was carried out in September to forecast infestation levels in 1990 (Table 3). At each of the sites, sampled trees were cut down and the number of new egg bands found on the branches was recorded. These data can be used to forecast the infestation level for the next season. Generally, the infestation is expected to persist in the areas in which it was currently found. At almost all of the sample points across the northern part of the Huronia and Lindsay districts, forecasts for 1990 were for severe damage. Although egg counts were not extremely high, sufficient numbers were present to warrant a forecast of severe defoliation for 1990. Pockets of moderate

# HURONIA, MAPLE and LINDSAY DISTRICTS

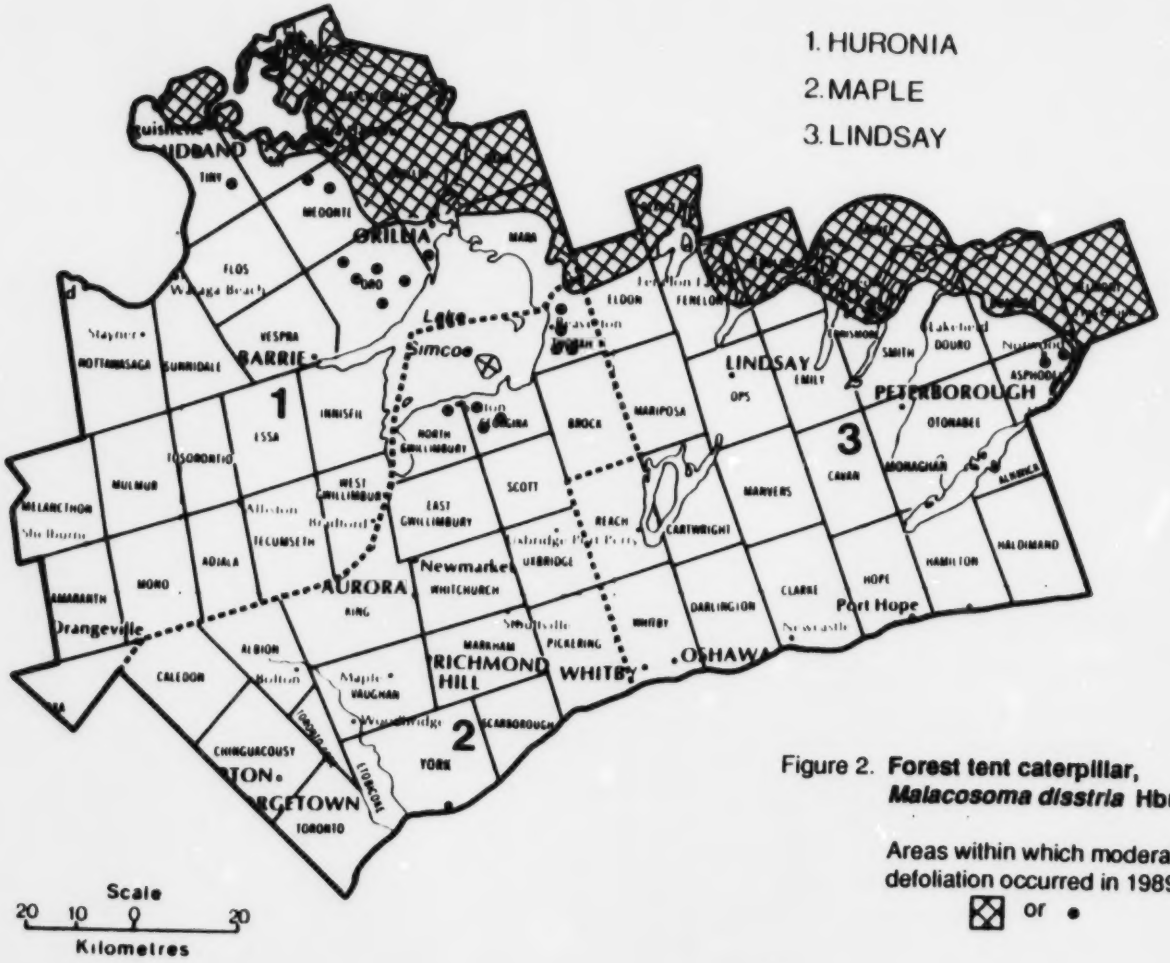


Figure 2. **Forest tent caterpillar, *Malacosoma disstria* Hbn.**

Areas within which moderate-to-severe defoliation occurred in 1989

or •

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and severe damage may be present in the northern part of Maple District. Light and moderate infestation forecasts were recorded for the north-eastern corner of Lindsay District and for more southerly locations in the Huronia District (Fig. 3).

Table 3. A summary of forest tent caterpillar egg-band counts on trembling aspen in the Central Region, with infestation forecasts for 1990.

| Location (Twp) | Avg DBH of trees (cm) | Avg no. of egg bands per tree | Infestation forecast for 1990 |
|---|---|---|---|
| Huronia District | | | |
| Baxter - Six Mile Lake Prov. Pk | 16 | 19 | severe |
| Mara | 16 | 43 | severe |
| Matchedash | 17 | 40 | severe |
| Medonte | 16 | 7 | moderate |
| Orillia | 16 | 18 | severe |
| Oro | 16 | 8 | moderate |
| Rama | 16 | 23 | severe |
| Tiny | 16 | 3 | light |
| Tiny - Awenda Pk | 21 | 36 | severe |
| Lindsay District | | | |
| Belmont | 9 | 3 | moderate |
| Bexley | 10 | 6 | severe |
| Dummer | 9 | 1 | light |
| Harvey | 10 | 10 | severe |
| Maple District | | | |
| Brock | 14 | 9 | severe |
| Georgina | 14 | 4 | moderate |
| Thorah | 16 | 3 | light |

# HURONIA, MAPLE and LINDSAY DISTRICTS

Figure 3. **Forest tent caterpillar, *Malacosoma disstria* Hbn.**

Locations of egg-band counts and defoliation forecasts for 1990

Severe ..... ●
Moderate ..... ■
Light ..... ▲

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Forestry Canada, Ontario Region

Table 4. Other forest insects

| Insect | Host(s) | Remarks |
|---|---|---|
| *Acantholyda erythrocephala* (L.) Pine false webworm | rP | The highest numbers were encountered in a 5-ha plantation of 5-m red pine (*Pinus resinosa* Ait.) in Harvey Twp, Lindsay District. Defoliation levels averaged 90%, with all trees in the plantation attacked. Populations were again heavy in a small patch of trees within a 2-m red pine plantation in Oro Twp, Huronia District. Additional information about this insect can be found in the Eastern White Pine Plantation writeup of the Special Survey portion of this report. |
| *Alsophila pometaria* (Harr.) Fall cankerworm | hard-woods | low populations in Sheppards Bush in Whitchurch Twp, Maple District |
| *Chionaspis pinifoliae* (Fitch) Pine needle scale | scP | high populations in an 18-ha plantation in Wainfleet Twp, Niagara District |
| *Coleophora comptoniella* (McD.) Lesser birch casebearer | wB | low numbers on 4-m trees in Hope Twp, Lindsay District |
| *Corthylus punctatissimus* (Zimm.) Pitted ambrosia beetle | sM | Mortality levels of 10% in 50-cm regeneration were common at a few sites in the region. |
| *Datana integerrima* G. & R. Walnut caterpillar | bWa, Bu | Defoliation levels ranging from 80 to 100% on 5% of 8-m trees were observed in Seneca Twp, with 50% defoliation levels on occasional 5-m trees in Thorold Twp, Niagara District. |
| *Dioryctria reniculelloides* Mut. & Mun. Spruce coneworm | wS | a light infestation in a 2-ha plantation of 5-m trees in Bexley Twp, Lindsay District |
| *Diprion similis* (Htg.) Introduced pine sawfly | scP | low populations on 2-m roadside trees in Haldimand Twp, Lindsay District |

(cont'd)

Table 4. Other forest insects (cont'd)

| Insect | Host(s) | Remarks |
|---|---|---|
| *Fenusa pusilla* (Lep.)<br>Birch leafminer | birch | Populations were much lower this year, except on a few ornamentals near the town of Alliston in Huronia District. |
| *Griselda radicana* Heinr.<br>Redstriped needleworm | rP | light defoliation of 5-m trees in a plantation in Bexley Twp, Lindsay District |
| *Hyphantria cunea* (Drury)<br>Fall webworm | hard-woods | Populations were up slightly in Niagara District, with 50% defoliation levels observed on scattered trees in Dunn Twp. Elsewhere in the region, only single tents were seen at various locations. |
| *Ips pini* (Say)<br>Pine engraver | rP | This insect is usually associated with dead or stressed trees. High populations were found in pockets of tree mortality in Hope and Hamilton twps, Lindsay District. |
| *Neodiprion abietis* complex<br>Balsam fir sawfly | wS | low numbers of larvae on 1% of the 5-m trees in a 2-ha plantation in Bexley Twp, Lindsay District |
| *Neodiprion sertifer* (Geoff.)<br>European pine sawfly | rP, scP, jP, mP | Increased populations were recorded in the Lindsay District. Defoliation levels ranging from 30 to 50% were observed on roadside trees in Hope and Haldimand twps. Moderate populations were detected in a 5-ha plantation of 5-m trees in Harvey Twp and on ornamentals in Bexley Twp, Lindsay District. High numbers were observed on a few young trees in West Gwillimbury Twp, Huronia District. Various population levels were recorded at many other points in the region. |

(cont'd)

Table 4. Other forest insects (concl.)

| Insect | Host(s) | Remarks |
|---|---|---|
| *Pikonema alaskensis* (Roh.) Yellowheaded spruce sawfly | wS | In Eldon Twp, Lindsay District, 21% of the 1-m trees in a 3-ha plantation had average defoliation levels of 11%; <1% tree mortality resulted. Previously recorded populations in the Huronia District collapsed in 1989. |
| *Pissodes strobi* (Peck) White pine weevil | wP | For information about this insect in 1989 refer to the Eastern White Pine Plantation writeup in the Special Surveys section of this report. |
| *Podapion gallicola* Riley Pine gall weevil | rP | Mortality of lower branches was common in many older plantations across the region. |
| *Rhyacionia buoliana* (D. & S.) European pine shoot moth | scP | 10 to 25% lateral shoot infestation on 2-m trees in Bertie Twp, Niagara District |
| *Rhynchaenus rufipes* (LeC.) Willow flea weevil | W | High populations continued at McRae Point Provincial Park, Huronia District. |
| *Tetralopha asperatella* (Clem.) Maple webworm | sM | Defoliation levels ranging from 5 to 20% were found in stands previously damaged by the forest tent caterpillar in Huronia District and on 15-m ornamentals in Otonabee and Mariposa twps, Lindsay District. |

## TREE DISEASES

### *Major Diseases*

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard

In all, 34 red pine (*Pinus resinosa* Ait.) plantations ranging in height from 1 to 22 m were examined in 1989 (Fig. 4). There was no sign of infection by the European or North American races of this fungus in the stands examined. The tip blight, *Cenangium ferruginosum* Fr. : Fr., was found fruiting on dead branches of some of the 5-m red pine in a 2-ha plantation in Nottawasaga Township, Huronia District. Various other types of damage were observed, and were attributed to agents such as tip blight, *Sphaeropsis sapinea* (Fr.) Dyko & B. Sutton, Armillaria root rot, *Armillaria ostoyae* (Romagn.) Herink, Fomes root rot, *Heterobasidion annosum* (Fr.) Bref., pine gall weevil, *Podapion gallicola* Riley, porcupines, and lightning strikes.

Tip Blight, *Sphaeropsis sapinea* (Fr.) Dyko & B. Sutton

A reduction in new infections was observed in 1989. This is possibly due in part to the dry summers we have been having over the past couple of years. The spores that spread this disease are usually released during periods of wet weather. In an 18-ha Scots pine (*Pinus sylvestris* L.) plantation in Wainfleet Township, Niagara District, the cumulative level of tree mortality was approximately 80%. It appeared that these 7-m trees had been under heavy attack by this disease for the past 3 to 4 years. Branch and whole-tree mortality of 2-m red pine was found in Clarke and Haldimand townships, Lindsay District. The cumulative affect of this tip blight on Scots pine is still very noticeable in the central parts of Maple and Cambridge districts, and to a lesser degree in parts of Huronia District. It is a recurring problem for homeowners with ornamental pine, particularly red and Austrian pine (*P. nigra* Arnold).

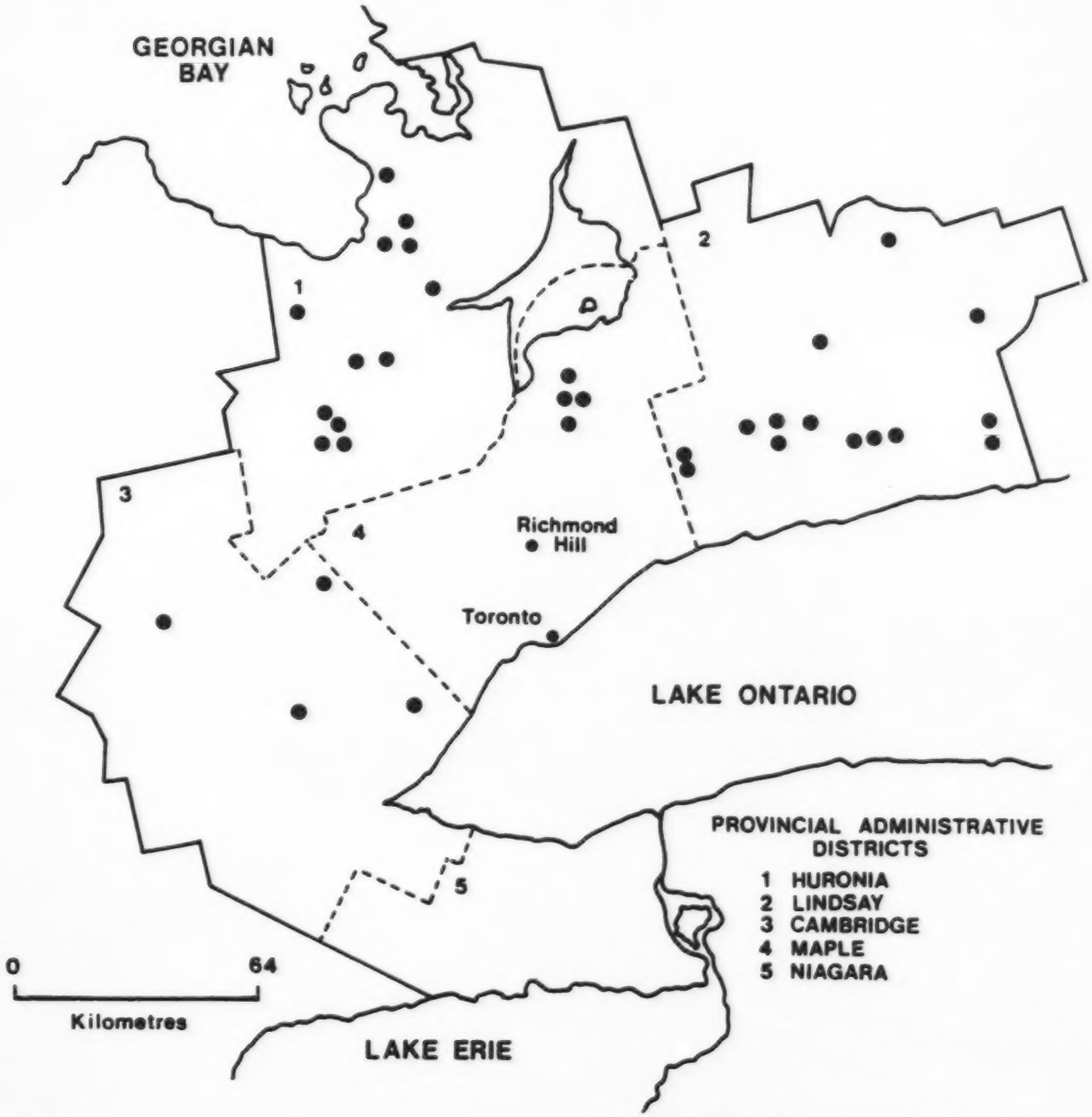



Figure 4. **Scleroderris canker, *Ascocalyx abietina* (Lagerb.) Schläpfer - Bernhard**

Locations at which red pine plantations were surveyed in 1989 ..... ●

Forest Insect and Disease Survey
Forestry Canada, Ontario Region

Table 5. Other forest diseases

| Organism | Host(s) | Remarks |
|---|---|---|
| *Asteroma caryae* (Peck) B. Sutton<br>Leaf spot of hickory | sHi | 20% leaf infection on 100% of the trees in woodlots ranging in size from 2 to 15 ha in the southwest corner of Niagara District |
| *Ceratocystis ulmi* (Buism.) C. Moreau<br>Dutch elm disease | wE | As the next generation of trees becomes more noticeable so does the recurrence of the disease. Infection levels are on the increase, and branch infection and tree mortality have been observed more frequently at various locations across the region. |
| *Discula* sp.<br>Anthracnose | wAs, Be | Ornamentals suffered various degrees of defoliation in Niagara District. |
| *Heterobasidion annosum* (Fr.) Bref.<br>Fomes root rot | rP | sometimes associated with mortality of older trees in various plantations in the region |
| *Microstroma juglandis* (Bereng.) Sacc.<br>White mold | Hi | 50% foliar infection at one site in Niagara District |
| *Mycosphaerella populicola* G.E. Thompson<br>Septoria leaf spot | bPo | A marked reduction was observed in the heavy infection levels of the past couple of years. The incidence was low at widely scattered points in the region. |
| *Phyllosticta sphaeropsoidea* Ell. & Ev.<br>Leaf blotch | horse-chestnut | 95% foliar damage widespread across the Niagara District |

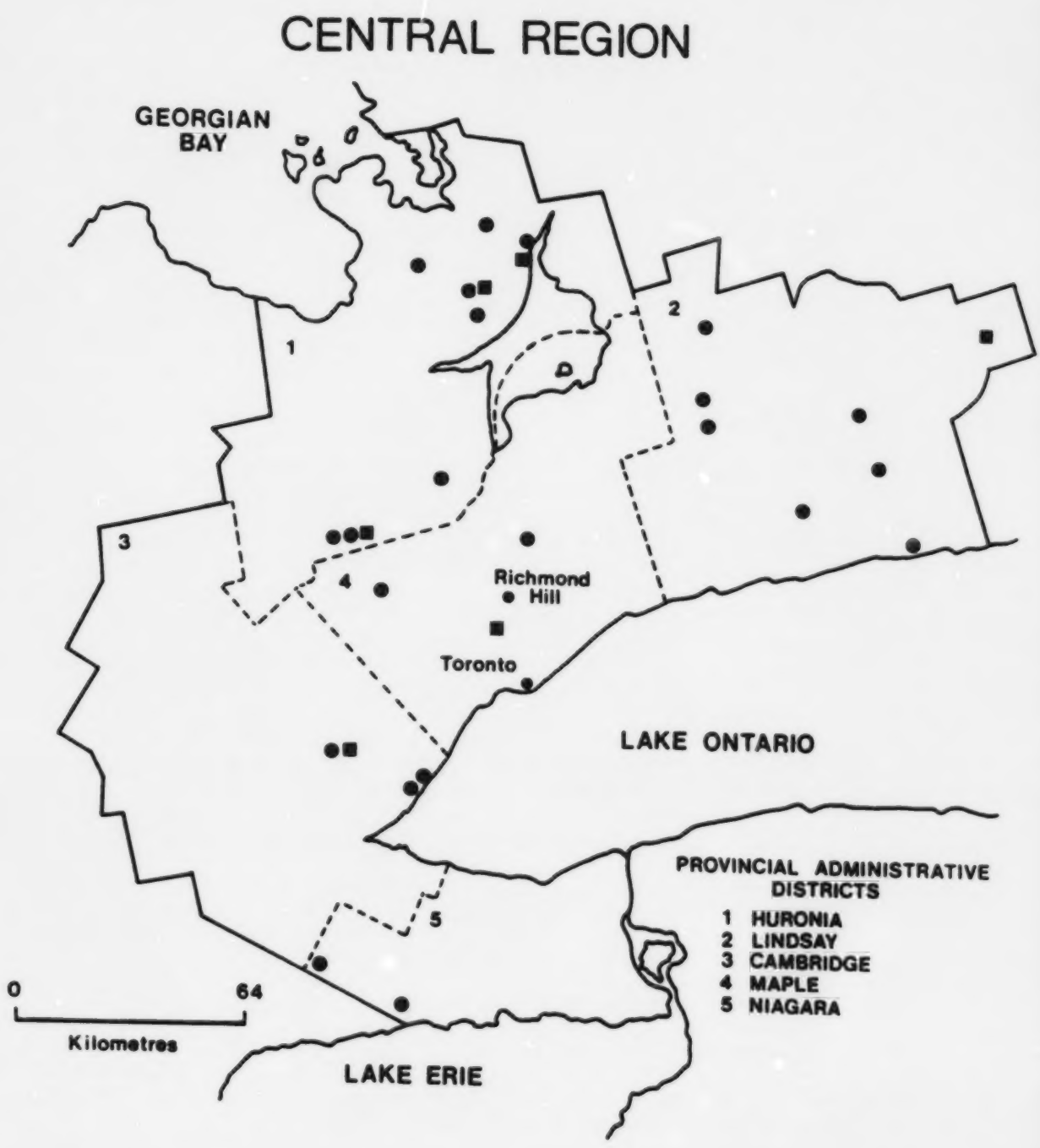
## FOREST HEALTH

### Maple Health

The work that was originally started in 1987 to study the condition of sugar maple (*Acer saccharum* Marsh.) in the Central Region was expanded this year with the addition of more 25-tree plots (Fig. 5). The original 10 plots were established in woodlots while the new ones were set up in two other types of areas in which maple is commonly found in southern Ontario. The first was a rural location in which trees were growing adjacent to a roadway. The other included trees planted as ornamentals in urban centers, usually as boulevard or park trees. Data on current and cumulative dieback from the original woodlot plots are summarized in Table 6 and those from the urban/rural plots are summarized in Table 7. Current dieback is based on only those branches that died in the past year and cumulative dieback is the total dieback that has accumulated over a period of time. Almost all of the trees examined were sugar maple, with the exception of those in the urban plot in Little Britain, Lindsay District, about half of which were black maple (*A. nigrum* Michx. f.).

Some minor increases in the amount of dieback were recorded in the woodlot plots. In seven of the 10 woodlot plots small numbers of trees moved up a category into the 6-20% dieback range (Table 6). The plot in Oneida Township, Niagara District exhibited the greatest changes, with more trees in each of the dieback categories except the >60% category. In addition, one tree was cut down in this plot, which is currently being managed for maple syrup production. Damage typical of that caused by pear thrips, *Taeniothrips inconsequens* (Uzel), was found affecting 100% of the sugar maple regeneration and understory trees in the stand in Trafalgar Township, Cambridge District. (For further information on pear thrips, see Special Surveys.) No damage of any consequence was found on the plot trees on the woodlot sites.

There was a marked difference in the condition of the sample trees examined in both the urban and the rural plots in comparison with those of the woodlots. Much more dieback was evident in the urban and rural plots (Table 7). This is due mainly to the greater range of disturbances and stress factors that can have an impact on these trees. There were from three to seven trees in the 41-60% cumulative dieback range in four of the plots. Five plots also had small numbers of trees in the $\geq$61% range. The percentage of trees in the 6-20% current dieback range varied from 28 to 60% in comparison with a maximum of only 16% in the woodlot plots. Defoliation by insects was not a problem in any of the plots this year; only 8% average defoliation by forest tent caterpillar was recorded in the Peterborough plot and 6% defoliation by maple webworm was recorded in the Peterborough and Little Britain plots in Lindsay District. Damage by the sugar maple borer, *Glycobius speciosus* (Say), was found in 24% of the trees in Clarke Township and 8% and 4% of the trees in Little Britain and Peterborough, respectively, in Lindsay District. Some trees on five of the plots were affected by heartwood rot fungus, but without further internal investigation the




Forest Insect and Disease Survey
Forestry Canada, Ontario Region

Figure 5. **Maple health plots 1989**

25-tree plots ..... ●
North American Maple
Project plots ..... ■

Table 6. Summary of maple health at woodlot locations in the Central Region from 1987 to 1989 (25 sugar maple examined at each location)

| Location (Twp) | Avg ht (m) | Avg DBH (cm) | Year | Current dieback[a] | | | | | | Cumulative dieback[a] | | | | | | Trees blown down or cut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 | |
| | | | | No. of trees | | | | | | | | | | | | |
| **Cambridge District** | | | | | | | | | | | | | | | | |
| Nassagaweya | 27 | 31.5 | 1987 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1988 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1989 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| Trafalgar | 35 | 43.6 | 1987 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1988 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1989 | 23 | 2 | 0 | 0 | 0 | 0 | 23 | 2 | 0 | 0 | 0 | 0 | 0 |
| **Huronia District** | | | | | | | | | | | | | | | | |
| Adjala | 21 | 33.0 | 1987 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1988 | 24 | 1 | 0 | 0 | 0 | 0 | 24 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | | 1989 | 23 | 2 | 0 | 0 | 0 | 0 | 23 | 2 | 0 | 0 | 0 | 0 | 0 |
| Flos | 27 | 33.4 | 1987 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1988 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1989 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| Medonte | 30 | 38.0 | 1987 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1988 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1989 | 21 | 4 | 0 | 0 | 0 | 0 | 21 | 4 | 0 | 0 | 0 | 0 | 0 |
| Oro | 23 | 26.5 | 1987 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1988 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1989 | 24 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 | 0 | 0 |

(cont'd)

Table 6. Summary of maple health at woodlot locations in the Central Region from 1987 to 1989 (25 sugar maple examined at each location) (concl.)

| Location (Twp) | Avg ht (m) | Avg DBH (cm) | Year | Current dieback[a] | | | | | | Cumulative dieback[a] | | | | | | Trees blown down or cut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 | |
| | | | | No. of trees | | | | | | | | | | | | |
| **Maple District** | | | | | | | | | | | | | | | | |
| Albion | 29 | 39.7 | 1987 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1988 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1989 | 24 | 1 | 0 | 0 | 0 | 0 | 24 | 1 | 0 | 0 | 0 | 0 | 0 |
| Whitchurch | 21 | 35.5 | 1987 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1988 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1989 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Niagara District** | | | | | | | | | | | | | | | | |
| Oneida | 27 | 40.4 | 1987 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1988 | 24 | 1 | 0 | 0 | 0 | 0 | 25 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | | 1989 | 19 | 3 | 1 | 1 | 0 | 0 | 19 | 1 | 3 | 1 | 0 | 0 | 0 |
| South Cayuga | 21 | 21.2 | 1987 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1988 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 1989 | 24 | 1 | 0 | 0 | 0 | 0 | 24 | 1 | 0 | 0 | 0 | 0 | 0 |

[a] 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = ≥61%, 5 = dead tree

Table 7. Summary of maple health at 12 urban and rural locations in the Central Region in 1989 (25 maple trees examined at each location)

| Location | Plot type[a] | Avg ht (m) | Avg DBH (cm) | Current dieback[b] | | | | | | Cumulative dieback[b] | | | | | | Trees blown down or cut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 | |
| | | | | No. of trees | | | | | | | | | | | | |
| **Cambridge District** | | | | | | | | | | | | | | | | |
| Oakville | U | 20 | 82.5 | 13 | 10 | 2 | 0 | 0 | 0 | 13 | 10 | 2 | 0 | 0 | 0 | 0 |
| **Huronia District** | | | | | | | | | | | | | | | | |
| Mono Twp | R | 18 | 54.0 | 1 | 9 | 6 | 7 | 1 | 1 | 1 | 9 | 5 | 7 | 2 | 1 | 0 |
| Orillia | U | 21 | 66.1 | 7 | 14 | 4 | 0 | 0 | 0 | 7 | 11 | 4 | 3 | 0 | 0 | 0 |
| Oro Twp | R | 19 | 66.9 | 12 | 12 | 1 | 0 | 0 | 0 | 12 | 11 | 2 | 0 | 0 | 0 | 0 |
| West Gwillimbury | R | 15 | 69.9 | 8 | 8 | 4 | 5 | 0 | 0 | 8 | 7 | 4 | 5 | 1 | 0 | 0 |
| **Lindsay District** | | | | | | | | | | | | | | | | |
| Clarke Twp | R | 15 | 72.9 | 15 | 8 | 2 | 0 | 0 | 0 | 9 | 7 | 6 | 1 | 2 | 0 | 0 |
| Cobourg | U | 18 | 68.5 | 12 | 10 | 3 | 0 | 0 | 0 | 10 | 10 | 3 | 1 | 1 | 0 | 0 |
| Fenelon Twp | R | 14 | 57.3 | 13 | 8 | 3 | 1 | 0 | 0 | 12 | 7 | 5 | 1 | 0 | 0 | 0 |
| Hamilton Twp | R | 18 | 71.1 | 12 | 9 | 4 | 0 | 0 | 0 | 9 | 6 | 9 | 1 | 0 | 0 | 0 |
| Little Britain | U | 21 | 67.6 | 14 | 9 | 2 | 0 | 0 | 0 | 10 | 9 | 6 | 0 | 0 | 0 | 0 |
| Ops Twp | R | 13 | 61.1 | 5 | 15 | 4 | 1 | 0 | 0 | 2 | 8 | 10 | 4 | 1 | 0 | 0 |
| Peterborough | U | 19 | 51.1 | 18 | 7 | 0 | 0 | 0 | 0 | 12 | 13 | 0 | 0 | 0 | 0 | 0 |

[a] u = urban, R = rural (roadside)

[b] 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = ≥61%, 5 = dead tree

extent of the damage could not be determined. Many of the urban and rural plot trees had open wounds and scars on them that were indicative of the environment in which they were living and of the fact that many of them were overmature.

North American Maple Project

The plots established in 1988 were tallied again in 1989 (Fig. 5). For the purpose of this particular study crown dieback was based on an estimation of the volume of crown foliage lost as a result of the premature death of branches. Only recently killed branches in the upper exposed portions of the crown were considered. Any dead branches within the interior of the crown or in the lower portion of the crown were not considered to be the result of dieback but rather of suppression. Furthermore, snag branches without small twigs that died much earlier were not tallied as dieback. This system is similar to that used for current dieback in the Maple Health plots (Tables 6 and 7) except that the dieback classes are more defined in this study (Table 8). In 1989, most of the plot trees exhibited less than 5% dieback, but up to 10 trees were in the 6-15% range which, for the purpose of this survey, is considered to be indicative of light decline. In three plots more trees were recorded in the 16-25% class than in 1988. Single trees exhibited greater degrees of dieback, but they represented a very small percentage (2%) of the total trees examined. No significant new defects were observed this year. Defoliation by the forest tent caterpillar averaged 20% in Belmont Township, Lindsay District, and was down from the moderate-to-severe levels recorded last year.

Oak Health

Between 1988 and 1989, no dramatic changes were observed in the status of the red oak trees examined in the oak health plots. In the current dieback category, more trees were recorded in the 6-20% range in the Tiny Township plot at Awenda Provincial Park and a minor increase in the number of trees in the higher dieback ranges was observed in a few of the other plots (Table 9). Increased numbers of trees were recorded in the 6-20% range in the cumulative dieback category, particularly in the plots in Awenda Provincial Park in Huronia District and in Uxbridge Township in Maple District. Two plots in Huronia District contained more trees in the 21-40% cumulative dieback class than in 1988. Mortality levels increased by two trees at one plot and by one tree in each of two other plots (Table 9).

The oak leaf shredder did not have any impact on the plot trees in 1989, but forest tent caterpillar feeding resulted in average defoliation levels of 75% in the Awenda Provincial Park plot and 30% in the Farlain Lake plot in Huronia District. Population levels of the gypsy moth were sufficient in the Clarke Township location in Lindsay District to cause an average of 7% defoliation.

Table 8. Summary of the crown condition of sugar maple at six North American Maple Project plots in the Central Region in 1988 and 1989

| Location (Twp) | Avg DBH (cm) | Year | No. of sugar maple examined | Total percentage of dead crown | | | | | | | | | | | Trees dead | Trees blown down or cut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | 1-5 | 6-15 | 16-25 | 26-35 | 36-45 | 46-55 | 56-65 | 66-75 | 76-85 | 86-95 | 96-100 | |
| | | | | No. of trees | | | | | | | | | | | | |
| **Cambridge District** | | | | | | | | | | | | | | | | |
| Nassagaweya[a] | 30.0 | 1988 | 49 | 26 | 19 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1989 | 49 | 10 | 34 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Huronia District** | | | | | | | | | | | | | | | | |
| Adjala[a] | 30.4 | 1988 | 65 | 24 | 37 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1989 | 65 | 2 | 49 | 8 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Orillia[b] | 36.7 | 1988 | 53 | 25 | 24 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1989 | 53 | 16 | 29 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oro[a] | 23.5 | 1988 | 80 | 50 | 27 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1989 | 66 | 14 | 49 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| **Lindsay District** | | | | | | | | | | | | | | | | |
| Belmont[b] | 26.6 | 1988 | 55 | 0 | 43 | 9 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| | | 1989 | 55 | 0 | 38 | 10 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| **Maple District** | | | | | | | | | | | | | | | | |
| Vaughan[b] | 30.8 | 1988 | 47 | 33 | 8 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1989 | 47 | 23 | 19 | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |

[a] Undisturbed woodlot

[b] Trees currently tapped for maple syrup

Table 9. Summary of oak health at five locations in the Central Region of Ontario from 1984 to 1989 (100 red oak examined at each location).

| Location | Avg ht[a] (m) | Avg DBH[a] (cm) | Year | Current dieback[b] 0 | 1 | 2 | 3 | 4 | 5 | Cumulative dieback[b] 0 | 1 | 2 | 3 | 4 | 5 | Trees blown down or cut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | No. of trees | | | | | | | | | | | | |
| **Huronia District** | | | | | | | | | | | | | | | | |
| Tiny Twp Awenda Prov. Pk | 21.9 | 25.9 | 1984 | 76 | 0 | 0 | 0 | 0 | 9 | 6 | 56 | 9 | 4 | 1 | 9 | 15 |
| | | | 1985 | 74 | 2 | 0 | 0 | 0 | 9 | 4 | 62 | 9 | 0 | 1 | 9 | 15 |
| | | | 1986 | 75 | 0 | 0 | 0 | 0 | 10 | 31 | 41 | 2 | 1 | 0 | 10 | 15 |
| | | | 1987 | 69 | 5 | 0 | 0 | 0 | 11 | 41 | 29 | 4 | 0 | 0 | 11 | 15 |
| | | | 1988 | 49 | 25 | 0 | 0 | 0 | 11 | 30 | 37 | 7 | 0 | 0 | 11 | 15 |
| | | | 1989 | 10 | 58 | 4 | 2 | 0 | 11 | 8 | 49 | 13 | 4 | 0 | 11 | 15 |
| Tiny Twp Farlain Lake | 22.0 | 26.0 | 1984 | 67 | 0 | 0 | 0 | 0 | 33 | 0 | 31 | 25 | 6 | 5 | 33 | 0 |
| | | | 1985 | 64 | 1 | 0 | 0 | 0 | 34 | 0 | 49 | 12 | 3 | 1 | 34 | 1 |
| | | | 1986 | 61 | 0 | 0 | 0 | 0 | 33 | 28 | 25 | 7 | 1 | 0 | 33 | 6 |
| | | | 1987 | 56 | 4 | 1 | 0 | 0 | 33 | 36 | 22 | 2 | 1 | 0 | 33 | 6 |
| | | | 1988 | c | c | c | c | c | 33 | 23 | 32 | 5 | 1 | 0 | 33 | 6 |
| | | | 1989 | 33 | 26 | 2 | 0 | 0 | 33 | 25 | 27 | 8 | 1 | 0 | 33 | 6 |
| Mulmur Twp Dufferin Forest | 21.0 | 28.2 | 1984 | 90 | 2 | 0 | 0 | 0 | 4 | 1 | 52 | 33 | 6 | 0 | 4 | 4 |
| | | | 1985 | 89 | 3 | 0 | 0 | 0 | 4 | 0 | 71 | 19 | 2 | 0 | 4 | 4 |
| | | | 1986 | 92 | 0 | 0 | 0 | 0 | 4 | 55 | 35 | 2 | 0 | 0 | 4 | 4 |
| | | | 1987 | 87 | 2 | 1 | 0 | 0 | 6 | 64 | 22 | 3 | 0 | 1 | 6 | 4 |
| | | | 1988 | 61 | 26 | 1 | 1 | 0 | 7 | 52 | 33 | 3 | 0 | 1 | 7 | 4 |
| | | | 1989 | 48 | 33 | 5 | 1 | 0 | 9 | 39 | 34 | 12 | 2 | 0 | 9 | 4 |

(cont'd)

Table 9. Summary of oak health at five locations in the Central Region of Ontario from 1984 to 1989 (100 red oak examined at each location) (concl.).

| Location | Avg ht[a] (m) | Avg DBH[a] (cm) | Year | Current dieback[b] 0 | 1 | 2 | 3 | 4 | 5 | Cumulative dieback[b] 0 | 1 | 2 | 3 | 4 | 5 | Trees blown down or cut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | No. of trees | | | | | | | | | | | | |
| **Maple District** | | | | | | | | | | | | | | | | |
| Uxbridge Twp Durham Forest | 21.2 | 26.1 | 1984 | 74 | 2 | 0 | 0 | 0 | 24 | 0 | 40 | 27 | 6 | 3 | 24 | 0 |
| | | | 1985 | 75 | 0 | 0 | 0 | 0 | 25 | 0 | 53 | 17 | 4 | 1 | 25 | 0 |
| | | | 1986 | 75 | 0 | 0 | 0 | 0 | 25 | 0 | 62 | 12 | 1 | 0 | 25 | 0 |
| | | | 1987 | 53 | 20 | 1 | 0 | 0 | 26 | 4 | 46 | 24 | 0 | 0 | 26 | 0 |
| | | | 1988 | 8 | 47 | 1 | 0 | 0 | 26 | 3 | 33 | 19 | 1 | 0 | 26 | 0 |
| | | | 1989 | 43 | 28 | 1 | 1 | 0 | 27 | 7 | 47 | 17 | 2 | 0 | 27 | 0 |
| **Lindsay District** | | | | | | | | | | | | | | | | |
| Clarke Twp | 20.6 | 22.9 | 1984 | 87 | 3 | 0 | 0 | 0 | 10 | 37 | 39 | 10 | 2 | 2 | 10 | 0 |
| | | | 1985 | 74 | 12 | 1 | 2 | 0 | 11 | 21 | 45 | 19 | 2 | 2 | 11 | 0 |
| | | | 1986 | 86 | 1 | 1 | 0 | 1 | 11 | 28 | 38 | 16 | 5 | 2 | 11 | 0 |
| | | | 1987 | 80 | 7 | 1 | 0 | 0 | 12 | 37 | 42 | 6 | 2 | 1 | 12 | 0 |
| | | | 1988 | 49 | 32 | 4 | 0 | 2 | 13 | 23 | 54 | 7 | 1 | 2 | 13 | 0 |
| | | | 1989 | 67 | 16 | 2 | 1 | 0 | 14 | 28 | 48 | 7 | 1 | 2 | 14 | 0 |

[a] from 1977 measurements

[b] 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = ≥61%, 5 = dead tree

[c] data missing - 75 trees examined

## ABIOTIC DAMAGE

### Drought

Drought-caused damage mapped in 1989 decreased from 1988. The only areas in which drought-stressed trees were mapped were in the northeastern corner of Huronia District. In all, 550 ha of predominantly red oak growing on rocky sites lost their leaves in August. The damaged areas comprised three pockets in Matchedash Township and one pocket in Orillia Township. Another small (62-ha) patch of red oak in Orillia Township was stressed to the point at which the leaves remained on the trees, but were dried out and brown. Drought-related damage was also observed by OMNR in newly established conifer plantations.

Table 10. Other abiotic damage

| Type of damage | Host(s) | Remarks |
|---|---|---|
| Salt | rP, wP, eC | Brown foliage was a common sight; up to 100% of the trees adjacent to many of the major roads at numerous points in the region were affected. |
| Scorch | sM | Trees growing along fence lines and in open areas had upwards of 70% of their leaves affected at many locations across the region. |

## SPECIAL SURVEYS

### Eastern White Pine Plantations

This is the fourth time a special survey of selected eastern white pine plantations has been carried out. Table 10 summarizes the three major pests found affecting the trees examined in 1989. Though not recorded in the table, defoliation levels caused by the pine false webworm were very low. Moderate leader damage caused by the white pine weevil was found on 2.7-m trees in a plantation in Fenelon Township, Lindsay District. The most significant problem encountered in 1989 was white pine blister rust, which is caused by the fungus *Cronartium ribicola* J.C. Fischer. Tree mortality caused by this fungus was observed in two plots in Lindsay District, where stem cankers were also present (Table 10).

Additional insects were observed at some of the plantations. In most cases, just one pitch mass borer, *Synanthedon pini* (Kell.), was found on the trunks of 41% of the trees in Albion Township, Maple District. The eastern pine shoot borer, *Eucosma gloriola* Heinr., was recorded on 1% of the trees in Douro and Fenelon townships, Lindsay District, and on 2% of the trees in Tosorontio Township, Huronia District. Pine spittlebug, *Aphrophora cribrata* (Wlk.), was observed on 11% of the trees in Douro Township, with an average of three spittlebug colonies per tree.

A comparison of damage by five pests, which indicates the number of plantations affected and the average percentage of trees attacked during the 4 years that eastern white pine was surveyed, is given in Table 11. White pine weevil and blister rust had the greatest effect over the years because of the type of damage they inflict upon the trees. Weevil damage causes leader mortality involving more than 1 year's growth and blister rust infections on the main stem usually result in the death of the tree affected. White pine weevil damage was heaviest in 1983 and blister rust incidence was highest in 1980, with the 1989 levels close behind (Table 11).

## Eastern White Pine Cone and Seed Pests

As part of the focus on eastern white pine in 1989 a sample of 100 green second-year cones was collected from 15-m trees in a seed production area in Albion Township, Maple District. Over all, 20% of the cones were found to be damaged. Damage by the white pine cone borer, *Eucosma tocullionana* Heinr., was found in 40% (i.e., eight) of the cones, within which seed loss amounted to 47%. The white pine cone beetle, *Conophthorus coniperda* (Schw.), was found to have damaged six cones in the sample, and this resulted in a 41% seed loss. Damage to the remaining six cones was attributed to unknown causes. In comparison with the results of a similar survey carried out in 1986, fewer damaged cones and causal agents were found in the 1989 sample.

## Acid Rain National Early Warning System

Again in 1989, the sugar maple plot that was established in 1984 and the eastern white pine plot established in 1985 were checked for signs of damage by insects, diseases or abiotic agents. The only foliar damage present was caused by a trace population of maple webworm in the sugar maple plot in Oro Township, Huronia District. One eastern white pine in Erin Township, Cambridge District was damaged by porcupines, wtih the result that the top 3-m section of the tree died. No other type of damage was detected in the plots in 1989.

Table 11. A summary of the results of the eastern white pine plantation survey carried out in the Central Region in 1989

| Location (Twp) | Avg ht of trees (m) | Estimated stocking (trees/ha) | Estimated area affected (ha) | Pine false webworm | White pine weevil | White pine blister rust | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Trees affected (%) | Leaders affected (%) | Trees affected (%) | Stem cankers (%) | Mortality (%) |
| **Cambridge District** | | | | | | | | |
| Erin | 14.0 | 1,500 | 1.0 | 0 | 0 | 1 | 1 | 0 |
| **Huronia District** | | | | | | | | |
| Oro | 0.9 | 2,500 | 1.0 | 0 | 0 | 0 | 0 | 0 |
| Tosorontio | 1.5 | 900 | 0.5 | 15 | 0[a] | 1 | 0 | 0 |
| **Lindsay District** | | | | | | | | |
| Douro | 1.5 | 2,500 | 2.0 | 5 | 3 | 13 | 7 | 3 |
| Fenelon | 2.7 | 2,100 | 5.0 | 3 | 9 | 8 | 5 | 1 |
| **Maple District** | | | | | | | | |
| Albion | 16.0 | 700 | 2.0 | 0 | 0 | 0 | 0 | 0 |

[a] Portions damaged by weevil were pruned.

Table 12. A summary of the eastern white pine plantation survey for the 4 years it was carried out in the Central Region

| Year | Pine spittlebug | | Pine false webworm | | White pine weevil | | Pine bark adelgid | | White pine blister rust[a] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Plantations affected (no.) | Avg trees affected (%) | Plantations affected (no.) | Avg trees affected (%) | Plantations affected (no.) | Avg trees affected (%) | Plantations affected (no.) | Avg trees affected (%) | Plantations affected (no.) | Avg trees affected (%) |
| 1980 | 0 | 0 | 0 | 0 | 3 | 8 | 3 | 46 | 4 | 9 |
| 1983 | 8 | 5 | 3 | 33 | 4 | 12 | 4 | 25 | 3 | 2 |
| 1986 | 4 | 55 | 2 | 8 | 4 | 3 | 1 | 2 | 3 | 1 |
| 1989 | 1 | 11 | 3 | 8 | 2 | 6 | 0 | 0 | 4 | 6 |

[a] includes branch and stem cankers

Beech Scale, *Cryptococcus fagisuga* Linding., and Beech Bark Disease, *Nectria coccinea* (Pers. : Fr.) Fr. var. *faginata* Lohman, Watson & Ayers

As part of a survey for beech bark disease checks have been made for the beech scale insect. A prolonged infestation of the scale insect on beech (*Fagus grandifolia* Ehrh.) trunks can predispose the tree to attack by the beech bark disease fungus. The disease has not been found in the Central Region, but the scale insect has. A trace population was found at Short Hills Provincial Park in Thorold Township. This was the first time it has been collected in the Niagara District. In addition to the five townships in Maple District in which the insect has already been found, a trace population was observed in a small stand of beech in Sibbald Point Provincial Park in Georgina Township. This sample in Maple District represents the most northerly location in the region in which the insect has been found. The insect was not detected elsewhere in Cambridge or Lindsay districts.

Forest Tree Nursery Report

Two OMNR forest tree nurseries are located in the Central Region, one in the village of Midhurst in Huronia District and the other in the village of Orono in Lindsay District. The following report summarizes the status of pests encountered by FIDS rangers during visits to the Midhurst and Orono forest tree nurseries.

Again in 1989, the pine gall weevil was observed at Midhurst on some of the red pine windbreak trees, where it was causing low levels of branch mortality. Cedar leafminers were present at trace-to-low levels on some of the eastern white cedar windbreaks. Tip blight disease (caused by *S. sapinea*) in the surrounding Scots pine stands in the eastern portion of the nursery still poses a threat to compartments containing pine. The balsam twig aphid, *Mindarus abietinus* Koch, was collected on a few of the white spruce in compartment C-15 and about 5% of the eastern white cedar in compartment A-37 were damaged by the strawberry root weevil, *Otiorhynchus ovatus* (L.). Armillaria root rot continues to cause mortality in young eastern white cedar windbreaks at the Midhurst Forest Tree Nursery.

The European larch windbreak near compartment S-41 at the Orono forest tree nursery sustained 80% foliar damage caused by larch casebearer. Light defoliation by the orange spruce needleminer, *Coleotechnites piceaella* (Kft.), was observed on white spruce windbreaks and cedar leafminer feeding resulted in light damage to some of the eastern white cedar windbreaks. Winter drying damaged approximately 2% of the white spruce in compartment T-92 and dead tips and terminal bud mortality were found on 38% of the European larch in compartment S-31. Drought stress resulted in 20% mortality in a white spruce clonal orchard and 2% mortality in a Scots pine seed orchard at the Orono nursery.

Pear Thrips, *Taeniothrips inconsequens* (Uzel)

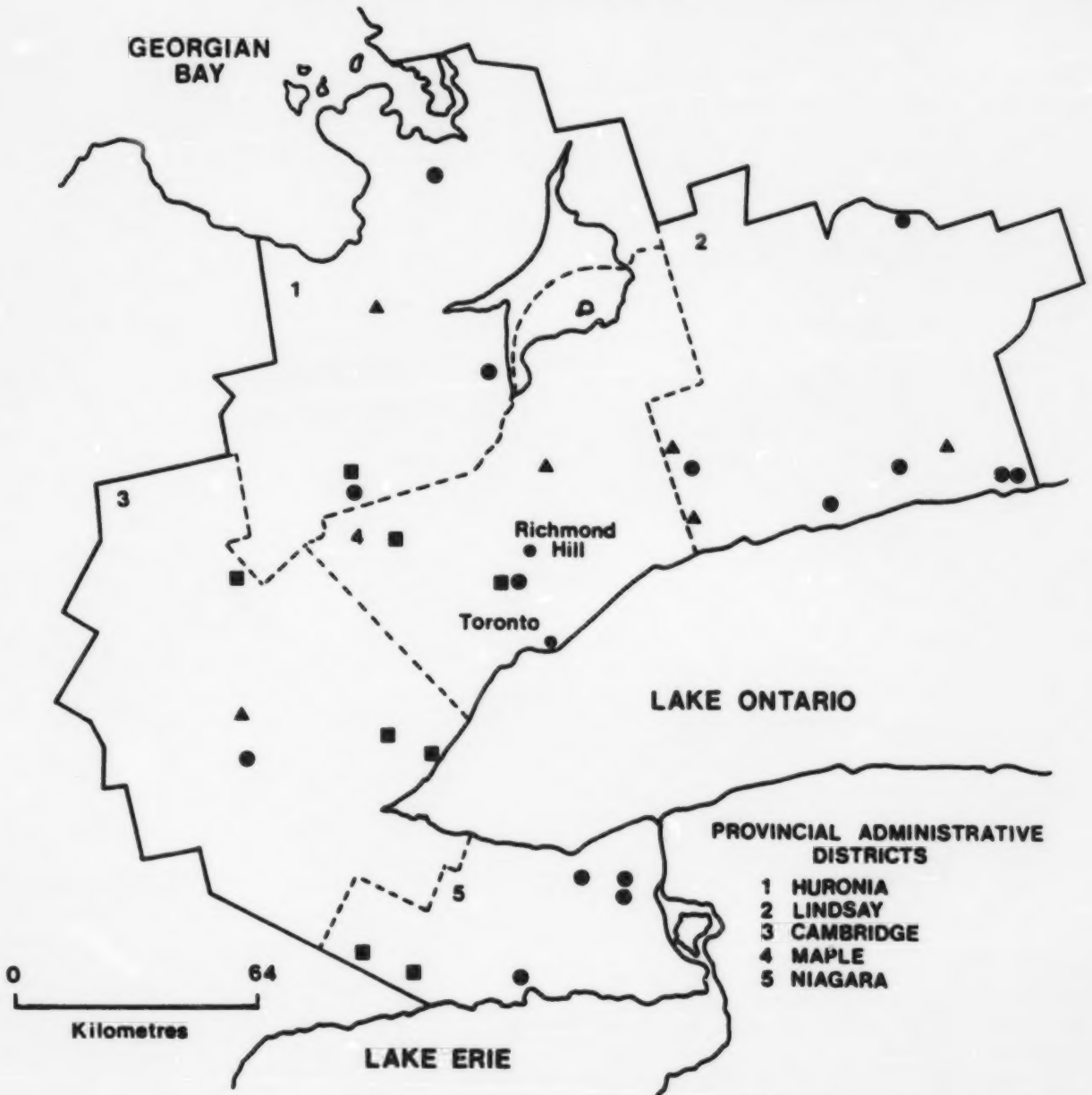
The pear thrips has recently become an important pest of forest trees, most noticeably on sugar maple in the northeastern United States. Previously, it was considered to be a problem only in fruit tree management. Records from the Ontario Ministry of Agriculture and Food research station at Vineland indicate that the pear thrips has been found in some Ontario orchards for a number of years; however, it is not considered to be a problem.

The adult pear thrips has sucking mouth parts, and most of the damage is inflicted when it feeds on the leaf surface. In forest stands, symptoms include fallen green leaves, leaves smaller than normal, chlorotic and tattered leaves, leaf margins frequently brown or wilted and leaves punctured or wrinkled. In addition, brown scars where eggs have been laid are generally evident on the veins and petiole on the underside of the leaf.

Because of the damage to forest stands in the United States, it was decided that FIDS staff should do a special survey to see if this tiny insect was present in sugar maple in Ontario. Pear thrips was found throughout most of the range of sugar maple in Ontario. In the Central Region, 22 sites were visited in May, 1989 and a sample of sugar maple flowers and leaf buds was collected from each site. Pear thrips adults were found in 15 of the samples (Fig. 6). Lindsay District had the highest number of positive samples, with adults found in Haldiman, Whitby, Clarke, Hope and Harvey townships. Four samples with adults present were collected in Niagara District, one in each of Wainfleet and Louth townships and two in Thorold Township. Pear thrips adults were also found in sugar maple flowers in Adjala, Medonte, and West Gwillimbury townships, Huronia District; in Waterloo Township, Cambridge District; and in Vaughan Township, Maple District. One sample from Darlington Township, Lindsay District contained thrips, but the species of thrips had not been identified at the time this report was written.

Later in the summer, damage to sugar maple typical of that caused by pear thrips was found at eight sites in four districts of the region (Fig. 6). The heaviest damage was observed on the regeneration and understory in a small portion of a stand in Trafalgar Township, Cambridge District, and on the regeneration at scattered points in a sugar bush in Oneida Township, Niagara District. The damage at both sites was similar to that previously mentioned, i.e., brown margins, wrinkled surface and chlorotic patches, and was found to be affecting 70-90% of the foliage (see Frontispiece). This same type of damage was found on sugar maple regeneration in stand openings in a mature stand in Vaughan Township, Maple District. It was also at this site that adult pear thrips were collected in May. Considerably smaller amounts of damage (1 to 5%) symptomatic of pear thrips were found on regeneration in West Garafraxa and Nassagaweya townships, Cambridge District; in Adjala Township, Huronia District; in Albion Township, Maple District; and in North Cayuga Township, Niagara District.

# CENTRAL REGION




Forest Insect and Disease Survey
Forestry Canada, Ontario Region

Figure 6. **Pear thrips,**
***Taeniothrips inconsequens*** **(Uzel)**

Results of surveys in 1989

Positive adult sample ..... ●
Typical damage observed ..... ■
Negative adult sample ..... ▲

Climatic Data

Various extremes in weather can cause different kinds of damage to forest trees. The extremes can mean either too much of one thing, such as very high winds causing blowdown, or a lack of another, such as low precipitation levels causing drought stress. Table 12 lists the mean monthly temperatures and total precipitation for 1989, as recorded by the Atmospheric Environment Service. The deviation from the 30-year average values is reported, and a comparison is made between the percentages of deviation in 1988 and 1989. Climate can vary greatly from district to district and these data represent information from two stations only in the Central Region.

Table 13. A summary of temperature and precipitation for 1989 at two locations in the Central Region of Ontario

| Location | Month | Mean temperature (°C) | | Deviation from normal | | Total precipitation (mm) | | Deviation from normal | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Normal | Actual | (°C) | (%) | Normal | Actual | 1989 (mm) | (%) | 1988 (%) |
| Peterborough Airport | January | -9.3 | -5.1 | +4.2 | +45 | 44.1 | 36.4 | -7.7 | -17 | -7 |
| | February | -8.5 | -7.9 | +0.6 | +7 | 48.9 | 25.2 | -23.7 | -48 | +19 |
| | March | -2.5 | -4.3 | -1.8 | -72 | 62.9 | 58.8 | -4.1 | -6 | -44 |
| | April | 6.0 | 3.9 | -2.1 | -35 | 71.8 | 43.4 | -28.4 | -40 | -1 |
| | May | 12.1 | 12.7 | +0.6 | +5 | 57.1 | 93.6 | +36.5 | +64 | +6 |
| | June | 16.8 | 17.9 | +1.1 | +7 | 60.4 | 97.6 | +37.2 | +62 | -32 |
| | July | 19.2 | 20.1 | +0.9 | +5 | 77.9 | 5.4 | -72.5 | -93 | -42 |
| | August | 18.1 | 17.9 | -0.2 | -1 | 74.2 | 74.4 | +0.2 | +<1 | -41 |
| | September | 14.0 | 13.9 | -0.1 | -1 | 72.9 | 106.2 | +33.3 | +46 | +5 |
| | October | 7.9 | 8.1 | +0.2 | +2 | 59.9 | 101.2 | +41.3 | +69 | +50 |
| | November | 2.1 | 0.3 | -1.8 | -86 | 69.4 | 112.2 | +42.8 | +62 | +17 |
| | December | -6.0 | -19.2 | -13.2 | -220 | 74.3 | 26.0 | -48.3 | -65 | -24 |
| Lester B. Pearson International Airport | January | -6.7 | -2.2 | +4.5 | +67 | 50.4 | 26.0 | -24.4 | -48 | -57 |
| | February | -6.1 | -6.5 | -0.4 | -7 | 46.0 | 18.9 | -27.1 | -59 | +40 |
| | March | -1.0 | -2.1 | -1.1 | -110 | 61.1 | 36.8 | -24.3 | -40 | -61 |
| | April | 6.2 | 5.1 | -1.1 | -18 | 70.0 | 41.1 | -28.9 | -41 | -21 |
| | May | 12.3 | 13.0 | +0.7 | +6 | 66.0 | 79.2 | +13.2 | +20 | -40 |
| | June | 17.7 | 18.4 | +0.7 | +4 | 67.1 | 94.7 | +27.6 | +41 | -63 |
| | July | 20.6 | 21.5 | +0.9 | +4 | 71.4 | 70.4 | -1.0 | -1 | +54 |
| | August | 19.7 | 19.7 | 0.0 | 0 | 76.8 | 39.6 | -37.2 | -48 | -52 |
| | September | 15.5 | 15.6 | +0.1 | +1 | 63.5 | 44.1 | -19.4 | -31 | +11 |
| | October | 9.3 | 9.8 | +0.5 | +5 | 61.8 | 76.2 | +14.4 | +23 | +9 |
| | November | 3.3 | 1.1 | -2.2 | -67 | 62.7 | 80.4 | +17.7 | +28 | -2 |
| | December | -3.5 | -14.7 | -11.2 | -320 | 64.7 | 23.8 | -40.9 | -63 | -51 |